

and neglect which those wounded in the field have necessarily to undergo. Too many men suffering under this class of wounds have been allowed to go to the rear after our great battles, and have turned up among the fatal cases in the statistics of secondary operations made at the general hospitals.

ART. VII.—*Epidemic Typhus, or Spotted Fever.* By WM. H. BALTZELL,
M. D., Frederick City, Md.

IN view of the attention that has, within the past few years, been attracted to an apparently novel disease, not only whose nature, but whose proper nomenclature even, remains still undetermined, I have been induced to add to the common stock some cases occurring in my own practice. This disease, pursuing the capricious course notable in other epidemics, has appeared in various localities throughout the country, only to excite alarm by its unusual malignancy and fatality, and to baffle the skill of our ablest physicians.

The difficulties attending the subject are considerable; and are indeed to be expected, when, from the vagaries of that mysterious force, which we denominate "epidemic influence," or in consequence of what Sydenham termed the prevailing "medical constitution," any disease has particular prominence given to some symptom or group of symptoms, thus obscuring or modifying its true character.

It has occurred to me that a solution of these difficulties might be at least approximated by regarding the subject from this point of view; and, that before acknowledging its novelty, it would be advisable to endeavour to reconcile its anomalies, with the peculiar operation of the essential causes of a known malady.

CASE I. On the 31st of March, 1864, I was called upon to visit Minty, slave of W. F. Berry, Esq., of Prince George. I found her propped up in a chair, complaining very much of muscular weakness, and of violent pains in the occipital and spinal regions; there was hyperæsthesia of the skin; any light or sudden touch caused her to shrink. The surface was hot and dry, communicating to the hand that sensation of pungency described in the books, under the name of "calor mordicans." Her countenance expressed considerable anxiety, and her respiration, although somewhat hurried, could not be called oppressed; there was neither cough nor pain in the chest. The bowels had been rather inactive for several days, but there was no marked constipation nor any tympanites; on the contrary, her abdomen seemed somewhat sunken; her appetite had completely failed her, though her stomach readily retained whatever nourishment or medicine she was directed to take. The pulse was about 110, full, soft, and compressible; the tongue was dryish, but not parched, and was completely covered with a thick yellowish-white fur, and retained the impression of

the teeth. The urine had been passed in the early morning, and had presented nothing unusual as to its appearance and quantity. She had been taken with a chill the previous night, which had continued several hours, and had not been succeeded by the customary febrile and sweating stages, but had left her in the condition in which I found her. She was ordered to take calomel gr. x and jalap gr. xx, and to have administered to her spirit of nitric ether and acetate of ammonia every two hours; sinapisms to be applied to the temples and nape, and stupes of turpentine along the spine; her diet to consist of rice-water and light chicken-soup—a small dose of Dover's powder to be taken at bedtime.

April 1st. Patient apparently worse in every particular; there was complete anorexia, and her pulse had increased in frequency, and was gaseous. The skin possessed the same pungent heat, and the tenderness of the surface was augmented; the purgative had produced but a trifling motion from the bowels, though the kidneys had acted freely, and her tongue was somewhat moist. The pain in the head and back had diminished, but she was very dull and drowsy, though easily aroused from this condition by any noise—when her countenance expressed a very curious intermixture of apathy and anxiety: she would relapse into sleep sometimes in the midst of a sentence. The cathartic having failed to have the desired effect, an enema of castor oil and turpentine was ordered. She was directed to take quinia gr. ij every two hours, and tinct. ferri chlorid. gtt. xx et potass. chlorat. gr. x twice in the course of the day: the Dover's powder to be again administered at bedtime. The application of the flannels, wrung in warm turpentine, to be continued, and the same articles of food to be given her regularly and at short intervals.

2d. Had passed a bad night, having been restless and wakeful, and also slightly delirious at times; the pain in the head and back seemed considerably relieved, though the head itself was preternaturally hot, and the eyes were slightly injected; the tenderness of the surface had abated. She complained of some stiffness of the neck, and the hands were slightly tremulous; the tongue had become somewhat moist, but evinced no disposition to clean itself: little effort seemed required to protrude it. The pulse was weak, quick, and frequent; there had been no moisture on the skin; and at the time of my visit she was very nervous and uncomfortable. The enema had produced two copious, dark-coloured, and, offensive stools; and there had been but a small quantity of urine discharged. She was directed to continue the quinia, chlorate of potassa and iron: the latter to be taken three times in the twenty-four hours; the Dover's powder to be repeated at night. Weak whiskey-toddy was to be furnished her at intervals, and her nutriment was to consist of beef or mutton soup and milk.

3d. Pulse still very weak and rapid; tongue dry, and fur on it somewhat of an ashen hue; sordes were commencing to collect upon the gums; abdomen flat; and no movement from the bowels since my last visit; what little urine had been passed was dark-coloured and offensive.

There was slight subsultus and considerable stupor, from which, however, she was easily aroused, when she gave correct replies to questions; there had been some moderate convulsive movements, during the early part of the night, which had been followed by the state of stupor in which I found her; the stiffness of the muscles of the neck had increased, and the head was slightly retracted. I directed calomel gr. $\frac{x}{2}$, and quinia gr. iij, to be administered every two hours, the chlorate of potassa and iron to be continued as before; an enema to be given, and a blister to be applied to

the nape; beef-tea and milk-punch; whiskey, beat up with white of eggs; sugar and nutmeg to be freely allowed.

4th. Very much worse; pulse thready and irregular; tongue brown and parched, and the gums covered with dark sordes; comatose, from which state she was with great difficulty aroused, when she moaned, and gave incoherent replies; continued subsultus; head retracted; deglutition performed with great difficulty. She had had one small black and horribly fetid discharge; and the bladder had been emptied once of a small quantity of offensive and ammoniacal urine. She was ordered to have carbonate of ammonia given to her every three hours, the quinia to be continued, and beef-tea and whiskey *ad libitum*. I replaced the blister on the nape of the neck—which had not drawn—with a fresh one; also sinapisms were applied to the wrists and ankles.

5th. Patient moribund, pulse absent from the wrists, head strongly retracted, and the muscles of the neck, chest, and back rigid; coma complete; countenance Hippocratic, and the surface bathed in a clammy sweat. Death occurred on the same evening. After death, I observed, for the first time, some ecchymotic spots on the sides of the neck; decomposition took place very speedily.

CASE II. Jim, the husband of Case I., had been most constant and assiduous in his attention to his wife during her illness; he had been complaining for several days of uneasy and uncomfortable feelings, and was at length compelled to take his bed on the 16th of April. His fever was of the same low, adynamic type, accompanied by heaviness, stupor, and rigidity of the muscles of the neck. Muttering delirium was present at the height of the attack, but no convulsions supervened. I could discover some petechiæ on the fourth day, upon the neck and upper portion of the chest. Under the same treatment to which his wife had been subjected, convalescence was established in about three weeks; but his restoration to complete health was very tedious and uncertain.

CASE III. Dennis, a cart-driver, was taken sick on the 21st of April; he made light of his indisposition, and insisted upon continuing his employment, contrary to the wishes of his master and myself, until the 24th, when he fell down in the field with what seemed an attack of vertigo. From this date his muscular power left him, and on the following day, being the fifth of his disease, I observed some few petechiæ upon the front part of his neck. The next day rigidity of the muscles of the neck and retraction of the head took place, followed by coma, and death, which occurred on the 28th of the month. His body gave evidence of putrefactive change very early after his death.

CASE IV. Ben, a gardener on the same plantation, fell, whilst engaged in his occupation, without ever having complained of any premonitory indisposition whatever. His pulse was almost imperceptible from the first, and the indications of nervous prostration were extreme; coldness of the surface, and muttering delirium. I was unable to establish reaction, although carbonate of ammonia, quinia, and stimulants were freely resorted to, and faithfully persisted in until his death, which was preceded by coma, and occurred on the third day of his illness.

CASE V. This case was that of Dick, a field-hand, of a rheumatic diathesis, and was complicated with violent pains in the ankles and knees.

There could be no mistake, however, as to the character of the disease, from the rigid condition of the muscles of the neck and the peculiar nervous phenomena accompanying it. The only variation made in the treatment consisted in the administration of colchicum, and the application of a succession of small blisters to the affected joints. He recovered after a tedious convalescence of about two months.

CASE VI. John Sweeney, a white man, the manager of an adjoining plantation, was first attacked with pleuritis; when the inflammation seemed to have been entirely subdued, he was suddenly seized with general convulsions; petechiæ made their appearance on the fourth day from that date. His case assumed a character very similar to those already reported, and, under similar treatment, he recovered, though it was five months before his strength was restored.

In relation to these cases, I would remark that all the negroes occupied the same cabin or quarter, and that it was located in a healthy, elevated, and well-drained spot. These tenements are usually constructed double, for the accommodation of two families, with two rooms and a loft on each side; the floors are generally composed of hardened clay; and whilst the cabins are warm and comfortable, their ventilation is defective. The domestic economy of their inmates is *not* a practical recognition of the truth that "cleanliness is akin to godliness." There was a filthy pig-sty on one side of the quarter, leaning against it, and a foul poultry-house on the other. The food furnished, though coarse, was always nutritious and abundant; and during their sickness every delicacy ordered was liberally supplied. I observed petechiæ in all the cases but two, and in them the colour of the skin was exceedingly dark. The bodies of all those who died speedily exhibited evidences of decomposition; but I was unable to procure any *post-mortem* examinations.

Concerning the nature of the disease under consideration, it is a circumstance worthy of remark that whenever a malady assumes any unusual form, or presents any anomalous symptoms, there is always too ready a disposition to accept the novelty of it. It is always an easier task to describe a disease than to analyze its symptoms; and the ready acceptance of a new medical theory involves less trouble, if not quite so much satisfaction, as the proof of it.

Whilst a very strong analogy is admitted by writers to exist between our vexed disease and typhus, it is remarkable that such a small degree of importance seems to be attached to this fact. Inquiry appears to have been based so completely upon the assumption of their distinctive nature, as to have precluded the exercise of any earnest effort to reconcile their various points of difference to the possible operation of influences ordinarily changing the type or masking the quality of disease. That rule of inductive inquiry which requires that no phenomena should be attributed to unknown causes that can be explained by the operation of those that are already known, does not appear to have been kept in view; and yet I

believe that a more careful analysis, and a closer application of this rule of Newton's Principia to the investigation of the nature of the complaint under consideration, must lead to the conclusion that those analogies between the two affections, that have been so freely admitted and yet so lightly considered, are indeed the "footprints of identity," and that in the spinal meningitis and spotted fever of the present day we have simply an anomalous form of typhus fever. I feel somewhat strengthened in this view from the fact that it in a measure coincides with that expressed by authors whose opinions are entitled to weight in the profession, relative to similar epidemics occurring in New England and France in the early part of the present century. "M. Boudin has identified this disease, as it appeared in France, with typhus fever, from the ordinary forms of which it differs simply in the seat of the local lesion. . . . Another strong argument in favour of this view of its nature is the powerlessness of purely antiphlogistic measures in its cure, whilst it yields not unfrequently to an opposite treatment. . . . The disease as it has occurred epidemically in the United States is probably of the same character. . . . I have little doubt that whenever it occurs as an apparent epidemic, presenting the grave characters above described, it is in fact a form of malignant fever belonging to the group of typhous diseases." (Wood, vol. ii. p. 766.) Dr. Nathan Strong regarded the disease as one of the forms of typhus. Dr. Gerhard says that it was similar in its nature to the British typhus. Dr. Bartlett, whilst differing in opinion, admits that "in many important particulars it bore a very striking resemblance to true typhus." Indeed, if we properly weigh and consider, in all their relations, these "many important particulars" of "striking resemblance," their reference to the operation of separate and distinct causes involves greater violence to the understanding than does the assumption that the points of difference are merely varieties in the mode of action of the same cause. I contend that their analogies are too forcible to justify us in the attempt to separate the two diseases without first submitting their dissimilarities to the test of a more rigid analysis. We must first endeavour to reconcile their differences, which are really mainly differences in degree, before we are authorized to seek a new name for this disease.

Let any inquirer carefully examine into these "striking resemblances," not indeed as he mayhap will discover them within the limited round of his personal experience, but as they force themselves upon his attention from the study of a large number of cases, and their significance cannot consistently receive that summary dismissal observed in most papers that have been written upon the subject. Both are adynamic febrile diseases, assuming at an early period a low nervous form; both are associated with a peculiar petechial accompaniment, and this, too, in a proportion of cases much more nearly equal than is generally supposed. Both diseases are prominently and uniformly marked by great functional disorder of the

cerebro-spinal axis; indeed, the febrile poison seems to have a special affinity for the organs controlling animal life, frequently destroying the patient by their overthrow, before any serious lesions are produced in those of organic life, save such as are effected by virtue of the connection of the two. The correspondence in the localities and circumstances mutually chosen by them both, under which to display their fatal power—the selection of ships, hospitals, contraband camps, and the crowded and ill-ventilated cabin of the slave, well known as the favourite fields in which typhus reaps its harvest of death—argues something more than mere coincidence and “striking resemblances.” Again, the similarity in the treatment regarded as appropriate to them both, by intelligent physicians, establishes a closer relationship between them than this fact alone should have been capable of suggesting. But a most important and forcible argument in favour of their identity is deducible from the very close correspondence of the anatomical lesions of the two affections. There is the same dark-coloured, fluid, and dissolved condition of the blood, and that passively congested appearance of the various internal organs incidental to that state of it. In both, the lower and posterior portions of the lungs exhibit evidences of a feeble attempt at inflammatory action. In both, there are effusions and congestions within the cranium, and frequently signs of previous inflammation. *Post-mortem* examination in typhus fever, equally well with those performed after death from this disease, justifies the following: “The conclusion is irresistible that the disease itself consists of a pathological condition of the system at large whereof the various local lesions enumerated above are but the accidental manifestations.” (*Lidell*.) It does not, however, enter into the projected plan of the present article to discuss the bearing and importance of the many particulars in which the two affections resemble each other, but rather to examine a little more closely into the weight of those points of dissimilarity that have been accepted as the basis of a differential diagnosis between them, and which present themselves with such force to some minds as to lead to the opinion that “they differ from each other as widely as typhoid fever differs from measles.” (*Lidell*.)

I think that the principal differences which have obscured the identity of our present epidemic with typhus may, upon a careful examination, be all included within the following two classes: I. Irregularities in the date and frequency of the appearance of the petechial spots. II. Irregularities occasioned by the peculiar character and violence of the head-symptoms.

I. First, as to the supposed great irregularities that exist in this disease, as compared with typhus, in connection with the petechial spots. It is asserted, by those who advocate the distinctive character of the two affections, that the variation between them, both in the date of the appearance of the petechiæ and their comparative infrequency in the present epidemic, is sufficient to warrant the opinion that the diseases are dissimilar. I propose to examine somewhat more particularly into these asserted differences,

and will do so under both relations. And first, as to their relative infrequency in "spinal meningitis." So much stress has been placed upon this fancied deviation, as to have led me to bring to bear upon it, the application of statistical inquiry; and, as is commonly the case, the result does not accord with the preconceived impression. For the sake of convenience, I have thrown the cases into a tabular form.

Name of Reporter.	No. of Cases.	Cases of Petechiæ.	Date of their Appearance.
Wales	7	7	4 on the first day; 2 on the second; 1 on the second. [the eighth.
Jenks	1	1	1 on the second.
Jewell	1	1	1 on the first.
Stillé	1	1	1 on the first.
Levick	4	4	3 on the first; 1 on the third.
Gilbert	3	3	3 on the second.
Edes	1	1	1 on the second.
Lidell	3	1	Observed after death.
Burns	12	3	2 on the first; 1 on the second; ecchymosis, vibices, &c.
Black	7	4	1 on the fourth.
Baltzell	6	4	2 on fourth; 1 on fifth; 1 after death.
	46	27	

I would state that all these cases were procured from reports in the *American Journal of the Medical Sciences*, from Jan. 1864, to April, 1865, inclusive. They were not selected cases, but comprise all reported in that Journal within that period, in which the date or absence of the spots is noted; for it must be here remarked that some writers, who attach the greatest diagnostic importance to this symptom, are least regardful of precision in reporting upon it.

We thus find, that in 46 cases, or (putting aside those of two negroes whose skin was very dark) in 44, the petechial spots were observed in 27, or in 61.3 per cent. Let us compare this result with some observations made upon their frequency in typhus. Rayer (p. 323) asserts "that of 194 attacked with typhus at Volterra, in 1817, 156 exhibited petechiæ," or, putting it in another form, 80 per cent. In Dr. Gerhard's cases, in Philadelphia in 1846, they were present in 32 out of 36 cases, or 88 per cent. Dr. Stoker states "that of 540 patients received into the Cork Street Hospital, 386 had petechiæ," or 71.4 per cent. (*Cyclopedia Practical Medicine*, vol. ii. p. 164, Am. Ed.) Throwing these results into the form of a table we have:—

	Cases.	Petechiæ.	Per cent.
Typhus (Rayer)	194	156	80
" (Gerhard)	36	32	88
" (Stoker)	540	386	71.4
Spinal Meningitis	44	27	61.3

It certainly does not appear to me that these differences are sufficiently great to justify us in attaching to them the diagnostic importance that they have received, especially when we recollect that in undisputed typhus these spots are "only frequent, not inseparable attendants" (Pringle); and that

"this petechial eruption is not constantly observed in typhus fever, but seems to form an occasional characteristic of some epidemics" (Tweedie). The truth is that prudence should lead us to refrain from attaching undue importance to any irregularities connected with petechiæ, when we recollect that attention was first particularly called to them at so recent a date as 1832; and that upon this subject "it is to be remembered that the diagnosis of typhus fever, by many who have written most extensively and most magisterially upon the subject, has been anything but rigorous and careful." (Bartlett, p. 208.) Even the slight difference, evidenced by the comparison I have instituted, would, in all probability, diminish upon the examination of a larger number of cases, for the popular name of "spotted fever" would seem to indicate a closer relation between this symptom and the prevailing disease, than the loosely recorded observations of some writers would suggest. Thus, Dr. Jenks (*Am. Journal Medical Sciences*, Jan. 1864, p. 283) says that the spots were present in a majority of cases, but as he only gives the date of their appearance in one case I was only able to embrace that one in the table.

Further analogy between the two diseases is deducible from the presence of ecchymoses, vibices, efflorescences, &c., observed by Drs. Burns and Black in those of their cases not marked by petechiæ, these constituting instances of "other eruptions, but none of them at all constant or characteristic, occasionally observed in this disease (typhus)." (Bartlett, p. 212.)

2d. As to the relatively earlier date of the petechial spots in the so-called "spinal meningitis," a reference to the table will show that the difference in this respect, between the two affections, is also not so great as is generally assumed. Thus, in 25 cases, in which the date of their appearance is given, excluding those only remarked after death, I find that they occurred on the 1st day in 11, on the 2d in 8, on the 3d in 1, on the 4th in 3, on the 5th in 1, and on the 8th in 1, the *average* date of their exhibition being on the 3d day. Let us now see what has been noted in typhus. Rayer and Stewart tell us that these spots appear from the 2d to the 13th day; Dr. Wood, that they are present from the 3d to the 13th; in Dr. Gerhard's cases they occurred from the 5th to the 8th; in the present disease from the 1st to the 8th. It is thus seen that between individual cases of typhus there is a greater variation in the date of their appearance than exists between their manifestation in that recognized disease and in the present epidemic, and there seems no reason why any arguments in favor of their distinctive character, that are based upon this variation, should not be equally as conclusive between two cases of typhus, for example, between a case in which the petechiæ are observed on the 2d day and one in which they are observed on the 13th day.

The fact seems to be that petechiæ have no regular date of appearance, but that they are incidental to certain physical changes of a toxæmic character wrought in the blood, and that the period of these changes is de-

pendent either upon the varying intensity of the poison or the relative susceptibility of the system to its influence. It cannot be denied, however, that there is a difference, and that the spots appear earlier in the present epidemic than in ordinary typhus, and it behooves us, if possible, to reconcile this difference with the identity of the two complaints. I think that undue importance has been attached to this variation in date, from our very generally confounding these spots with eruptions in the sense usually conveyed by the latter term, whereas the conditions precedent for their respective presence are almost directly opposite. Thus, an eruptive disease is usually associated in our minds with the idea of some inflammatory action in certain portions of the skin, which action itself involves either an increase or perversion of *vital* activity; whereas what are called petechial "eruptions" are dependent upon circumstances which, destroying the vital relation of the blood to its containing membranes, permit the operation of those *physical* forces that favour its escape from the capillary vessels.

Let these conditions exist, let these requisite changes be effected, the blood escapes from the vessels, and infiltrates the skin at a period synchronous with them, and this may occur in a few hours, as we see in poisoning from carbonic oxide (Christison), or, as we have seen in typhus, this period varying from the 2d to the 13th day. That the conditions favourable for the appearance of petechial "eruptions" are really incompatible with that state of the system suitable for a true eruptive process to occur, is seen in the fact that when they manifest themselves during the course of an exanthematous disease, they do so with the invariable effect of arresting or aborting the inflammatory action in the skin. Doubtless, much uncertainty and discussion have originated from the want of a practical recognition of these facts, and from our habit of esteeming typhus an exanthematous disease, in the same sense in which we regard variola and scarlatina to be such, when, in fact, the cutaneous changes in typhus are not accompanied by those "deranged sensations or evidences of vascular irritation or of inflammation" (Wood), which distinguish the eruptions peculiar to the latter diseases. The idea desired to be conveyed is this, that what are called the "eruptions" of typhus are due to certain physical changes wrought in the blood by the action of some toxæmic poison. They, being really exponents of these changes, may occur sooner or later, according as either the degree of intensity of the poison, or a diminished power of resistance in the system to its influence, may effect these changes. The correctness of this view seems to derive confirmation from the fact that the gravity of the attack and the mortality in both diseases correspond with the relative date in the exhibition of the petechiæ, as if they were indices of the degree in which the blood is corrupted. Thus I find that of the 11 cases in which the spots appeared on the first day there were 9 deaths, and in all the systematic works on typhus we find an early appearance of petechiæ included amongst the unfavourable symptoms as adding gravity to the prognosis. In this

connection it may be well to call to mind this practical truth: "Observations have been made, and the suspicion expressed, from time to time, that some of these (febrile poisons) cause death before their specific characteristics are developed, exciting rapidly fatal inflammation in the brain, heart, and lungs, and other organs." (*Medico-Chirurgical Review*, Jan. 1849, p. 80.) Inasmuch as so great discussion has arisen, in connection with these petechial spots, a short *resumé* of their probable pathology will not be foreign to a more satisfactory elucidation of our subject. Under the caption of "Peculiar States of the Skin not referable to Inflammation" Rayer defines petechiæ to be "minute red or violet-coloured spots, formed by small quantities of blood deposited within the substance of the skin." The conditions requisite for its escape consist of certain changes of a degenerative character occurring in the blood, and a stasis of that fluid in the capillaries. These changes in the blood consist in a diminution of its specific gravity and its greater fluidity; both the corpuscles and fibrin, as well as its albumen and salts, are reduced to a proportion below even the minimum in healthy blood. The globules are broken down and softened, and readily part with their colouring matter. As might be supposed, its power to convey oxygen is impaired or destroyed, as the experimental researches of Hoppe and Virchow have actually demonstrated. (Virchow, *Cell. Path.*, p. 262.) "In malignant typhus the blood is very fluid, coagulates imperfectly or not at all, and the serum is of various shades, from a bright yellow to a red tint. The hæmato-globulin is dissolved in the liquor-sanguinis, and then red or yellow transudation takes place." (*Brit. and For. Med.-Chir. Rev.*, Jan. 1849, p. 96.) But in consequence of these changes in the blood, the power of all those forces that contribute to its motion through the capillaries is impaired. The heart, not receiving its accustomed stimulus of healthy oxygenated blood, has its propulsive energies weakened. The *nervi vasorum* become paralyzed from the influence upon their centres of the carbonated and corrupted fluid. The functions of nutrition, secretion, &c., upon which its motion in part depends (Carpenter), cease to be performed, and that chemical affinity between the membranous walls and the contained fluid, which influences capillary motion, the active agent of which affinity is oxygen (Draper), is destroyed. Hence a stasis necessarily occurs. We thus have the dissolved fluid and semi-putrid blood stagnated within the weakened and distended walls of its capillaries, these being conditions favourable for the display of the physical forces of imbibition and infiltration, shown by Matteucci to be the active agents in the phenomena of effusion and exudation. The hue of the petechial spots may vary from a yellowish to a dark-red or purplish colour, according to the degree in which the hæmato-globulin is dissolved in the transuded liquor-sanguinis, or the blood itself may escape from the ruptured walls of the capillaries. It will be recollected that these ecchymotic phenomena are not confined to the skin in this disease, but are observed in various internal tissues, thus

agreeing in another important respect with typhus. "These spots or exudations of blood are not confined to the skin, but spread over the serous and mucous membranes, hence, in fatal cases of petechial fever, the surface of the viscera has been found studded with small, bloody effusions." (*Cyc. Pract. Med.*, vol. ii. p. 164.) If this view be correct, if the spots be really due to the action of physical causes, the operation of which may take place indifferently in typhus from the 2d to the 13th day, and in this epidemic from the 1st to the 8th day, and if these variations be completely explicable, by the fact of a varying intensity of the toxæmia, as evidenced by the relative mortality associated with their period, surely there is no basis here upon which to erect a differential diagnosis.

II. Irregularities, occasioned by the peculiar character and violence of the head symptoms: Perhaps more discussion has arisen from a conflict of opinion concerning these symptoms and their asserted great dissimilarity in the two diseases, than from any supposed variation in the cutaneous accompaniment; and yet, I think that it can be shown that those, and they are numerous, who, regarding it as a novel disease, have proposed for it the name of "Cerebro-spinal Meningitis," have lost sight of the essence of the disease in consequence of the prominence of a complication. Their opinion is based mainly upon, 1st, the asserted wide difference between the anatomical cerebral lesions that appear in typhus and those characteristic of this disease; and 2d, the frequency of coma and convulsions in this, and their assumed rarity in typhus. I will first consider the pathological changes within the cranium, and admitting that differences, to some extent, do exist, I will compare them a little closely, so as to see if they be so decided as to warrant us in separating the two diseases.

Lesions of Cerebro-spinal Aris.

SPINAL MENINGITIS.

Case I. "A large quantity of serum flowed out in removing the calvarium. A moderate quantity of serum beneath the visceral arachnoid membrane which had lost its transparency. * * * Moderate quantity of limpid serum in the ventricles. * * * Choroid plexus thickened, cerebrum, cerebellum, pons Varolii, and medulla oblongata moderately congested. Much serum in the spinal canal, its arachnoid membrane opacified; vessels intensely congested; structure of the cord not presenting any abnormality." (*Lidell, Am. Journ.*, Jan. 1865, p. 19.)

Case II. "Upon removing the calvarium about four ounces of blood and serum flowed out. The veins and sinuses of the brain were congested with fluid blood; there was a moderate amount of sub-arachnoid effusion over the hemispheres, and the ventricles contained about an ounce of serum. The spinal

TYPHUS FEVER.

"In all the cases reported by Dr. Gerhard there was unusual engorgement of the sinuses and larger vessels of the brain. These were filled with dark-coloured, fluid blood. * * * Varying quantities of serum, from one to two drachms to one or two ounces were found in a certain proportion of cases under the arachnoid, or within the ventricles. In every case, but one, the bloodvessels of the brain are said to have been well filled; their congested condition was indicated by the number of bloody spots which appeared upon the cut surfaces." (*Bartlett*, pp. 218, 219.)

"In the majority of cases the arachnoid membrane exhibits traces of previous inflammatory action; it is sometimes simply vascular, in other cases thickened and opaque, with more or less effusion between it and the pia mater. In the ventricles there is generally a small quantity

cord and its membranes appeared healthy, and there was no congestion of them." (Lidell, *Am. Journ.*, Jan. 1865, p. 22.)

Case III. "The vessels of the dura mater were markedly congested with fluid blood very dark in colour. A yellow effusion existed in the sub-arachnoid space; it proved to be of a serous character and to exist in the spinal canal also. The substance of the brain was with very little, if any, congestion. In the lateral ventricles there was a somewhat abundant reddish serum, and, on cutting into the brain substance, the gap would soon fill up with serum exuding from the cut surfaces." (Jewell, *Am. Journ.*, July, 1864, p. 131.)

Case IV. "On removing the calvaria a large ecchymosis was found under the pericranium (?) near the sagittal suture. The vessels of the dura mater were filled with dark fluid blood which could readily be pushed aside by the handle of the scalpel. The substance of the brain and of the medulla oblongata was natural in its appearance and consistence. There was no effusion in the ventricles, and the most careful examination failed to detect the slightest evidence of inflammatory exudation." (Dr. Levick, *Am. Journ.*, July, 1864, p. 136.)

Case V. "The brain was found much congested, the veins being distended to their utmost capacity; there was a small amount of serum effused at the base of the brain, and there appeared to be a slightly softened condition of the upper portion of the spinal cord." (Jenks, *Am. Journ.*, Jan. 1864, p. 283.)

Case VI. "Dura mater congested—some vascular streaks running towards growths on its surface; small group of granulation on left middle lobe. Dura mater adherent to brain at these points. Surface of the brain covered with greenish, purulent matter. * * * Base of the brain covered with a similar substance. The ventricles contained much serum, and the middle corona a little greenish pus. * * * The substance of the brain was congested, but otherwise apparently healthy." (Edes, *Am. Journ.*, July, 1864, p. 275.)

of serous fluid. The vessels of the pia mater are generally more numerous, distended, and tortuous. * * * Injection of the substance of the brain is not unusual.

* * * the bloodvessels are not only more distended but more numerous." "The cerebellum seldom exhibited any alteration, if we except that of the membranes at the base of the brain and the effusion with which it is frequently associated. When the medulla oblongata is divided, so as to allow the removal of the brain, a quantity of serous fluid escapes from the vertebral canal, in those cases in which there has been considerable effusion in the ventricles. The membranes which envelop the spinal cord have been occasionally found vascular, the substance of the medulla spinalis at the same time injected and softened." "With regard to the proportion of cases of fever (typhus) in which lesions of the brain have been discovered after death, Louis, in his recent work, states that in more than one-half the pia mater was injected with blood; in three-sevenths the cortical substance was redder than natural, in sixth-sevenths the medullary matter was injected." "Of 54 cases, examined at the London Fever Hospital, 37 exhibited evident traces of previous inflammation of the brain." (Tweedie, *Cyc. Pract. Med.*, vol. ii. p. 186. Art. Typhus.)

I would state that the six cases of the *post-mortem* appearances of the brain, in the present disease, comprise *all* reported in the journal referred to for the past eighteen months. I have no comment to make upon their comparison with typhus, other than that it rather appears as if the latter disease exhibits more evidences of inflammation within the cranium than does "cerebro-spinal meningitis."

2d. The frequency of coma and convulsions in this disease, and their asserted rarity in typhus: The supervention of coma is advanced as one of the evidences of the meningitis, in which our epidemic is said to consist; and death being usually preceded by that symptom, the fact has been regarded as diagnostic between it and typhus. In the first place, coma, itself a mere grade of stupor, "may be produced at any time by pressure within the brain, whether proceeding from vital causes forcing too much blood into the cerebral vessels, or giving rise to effusion within the cranium;" or from "mechanical causes, as depression of the bone," "from a direct sedative impression," "from a sympathetic irritation extended to the brain," "from the admission of venous or carbonated blood into the arteries of the brain." (Wood, vol. ii. pp. 674-675.) Coma, it is thus seen, is far from being necessarily symptomatic of inflammation of the brain, though it may be occasioned by it through some of its consecutive effects, as "forcing too much blood into the cerebral vessels, or giving rise to effusion within the cranium." But even these effects are equally the consequences of congestion and a carbonated state of the blood; and from the mere presence of serum within the ventricles or under the arachnoid, we are by no means justified in necessarily assuming that it is the result of inflammation. "This phenomena of imbibition may, in the case of solutions, holding in suspension very finely divided molecules of solid matter, be very valuable for ascertaining the different qualities of the blood according to its density. *In fact in certain maladies its density and viscosity are much diminished, and in these cases serous infiltrations take place.*" (Malleucci, Pereira's edit., p. 35.) But, even admitting the effusion to be the resultant of inflammation, I have shown by the comparison instituted that it takes place equally as often in typhus. It has been said that patients never die of coma in typhus, but that they always do so in this disease. Let us consult the record. Dr. Wood says: "The characteristic stupor of the disease becomes more and more developed. *Sometimes it deepens into profound coma.*" (Vol. i. p. 350.) Dr. Gerhard says that in the Philadelphia epidemic of 1836, "the delirium became more tranquil, and was exchanged for ordinary stupor or coma when the fever was at its height." (Bartlett, p. 195.) Again, "the stupor rarely passed into complete coma except in fatal cases, hence coma was always an unfavourable sign." (*Idem*, p. 197.) "The progress of the disease to a fatal termination is indicated by a more or less profound coma." (Tweedie, *Cyc. Pract. Med.*, vol. ii. p. 164.) "But we have a compound of coma and asthenia in which coma takes the lead." (Watson, Third edit., p. 942.) As particularly applicable to our present epidemic: "The cerebral complication is known by the more marked and early affection of the brain, more constant delirium and disposition to coma." (*Cyc. Pract. Med.*, vol. ii. p. 165.) "In some malignant epidemics the nervous system is overwhelmed at once in the very outset by the force of the poison. * * * The coma rapidly augments, and death may

ensue within twenty-four hours." (Watson, Third edit., p. 942.) From this it would appear that coma, so far from being an *unusual* termination in typhus, is in reality the *common form of death* in that malady, and that any distinction based upon this fancied deviation must also be abandoned. Coma is simply to be ranked amongst the ordinary grave and unfavourable symptoms of typhus.

Next as to convulsions: they certainly occur in our epidemic more frequently than in typhus as it ordinarily appears; but they are not at all necessarily symptomatic of meningitis, being in fact much more frequently occasioned by other conditions, as "strong and sudden emotion," "excessive heat," "exposure to cold," "the result of an irritation transmitted to the brain from some other part of the body," "indigestion," "too great vascular fulness," "nervous irritation," "vascular irritation or active congestion," "depression of the brain," "an impoverished state of the blood," "an excess of carbonaceous matter." (Wood, pp. 668, 683, vol. ii.) It is thus seen that convulsions are not a conclusive symptom of meningitis, and the fact is that they do sometimes occur in typhus; thus Dr. Wood says: "In some rare instances death is preceded by convulsions." (Vol. i. p. 351.) But the presence or absence of convulsions by no means argues the operation of distinct causes, for the same poison that occasions stupor and coma in one individual, may produce convulsions in another; a familiar example of this fact is witnessed in the effects of alcohol, whose ordinary action, when taken in excess, is to bring on stupor or coma, but which, in a certain proportion of cases, produces convulsions or drunken spasms. But if the presence of convulsions neither necessarily argues difference in the active poison, nor is itself conclusive evidence of inflammation, then in the absence of a more marked difference between the two diseases in the lesions caused by that process than is indicated by the comparative table, they lose their force as a diagnostic symptom. I think that some explanation of their frequency might be referred to the suddenness and intensity in the action of the febrile poison in our present epidemic. "There is a '*vis insita*' in our organism which acts in a conservative sense, and protects it from injurious agents." If the action of these agents be gradual, it is insensibly weakened, and imperceptibly yields, until all the graver phenomena occur without being thrown into actual throes of resistances. But if (as shown in this epidemic, by the early appearance of the petechiæ, the coma and convulsions) the power and concentration of the poison be great, the conservative energies and nervous sensibility being yet materially uninjured, the system makes violent struggles before yielding to the fatal influence of the miasm.

If the foregoing views be correct, if it has been shown that those differences between the two diseases that have been relied upon as the basis of a differential diagnosis, are either simply differences in degree, or vanish upon a closer inspection; and that no phenomena exist in our present epidemic that cannot be rationally referred to the operation of the causes that occa-

sion typhus, then we are not authorized in separating them, nor in applying the name of "cerebro-spinal meningitis" to the prevailing malady, unless, indeed, we add a spirit of improvement to that of innovation, and so also designate typhus fever.

Admitting that our epidemic is one of typhus, it remains to endeavour to account for its departure from the ordinary type of that affection; and this, I believe, may be explained by the application of the following truth: "On the most general view of the subject, numerous conditions will be found capable of giving different aspects, even to the effects of a common cause of disease, *the incidental direction of the morbid cause to some particular organ or texture of the body, and still more the quantity and intensity of the virus itself*; all these and other circumstances may be conceived as producing such modification." (Holland, *Notes and Reflections*, pp. 87, 88.) Our text-books abound in the phrases of "determination to some special organ," "complication of some local lesion," "modification caused by the particular portion of the system affected," yet in few of them have we accurate and specific accounts of the actual alterations in disease occasioned by these determinations, complications, or modifications. We all know that the same disease assumes different forms in different epidemics, by virtue of "the incidental direction of the morbid cause to some particular organ or texture;" we admit the fact, for the knowledge of it is as old as Hippocrates, but we do so too often in only a general sense, and not in the application of it. Now, it is exceedingly desirable, in investigating the nature of any disease, that our expressions should correspond in our minds to certain definite ideas, because we can only thus discover those essential qualities that are to be the basis, not only of its proper treatment, but of our attempted prophylaxis. Accounts of many different epidemics of typhus are given, complicated with a lesion of some particular organ. Would we not naturally expect the disease to have such modifications produced in its regular and ordinary symptoms as might be dependent upon the perturbed functions of the organ affected? And if the determination to the organ was sufficiently potent to occasion its inflammation, would we not naturally expect to see the evidences of that action after death in addition to the pathological changes usually observed in the disease? Would we not expect its ordinary duration to be shortened, and the mortality to be increased in proportion as the organ implicated was important in its influence over the maintenance of life?

Let us apply this to the theory of our present epidemic, being typhus with a local tendency to the brain; and those very differences, supposed to justify their separation, are really just what we would rationally look for in consequence of the complication. We would expect an increase of those functional disorders of the brain so characteristic of typhus; the stupor to deepen into coma; the subsultus to be magnified into convulsions; death to be more frequent and earlier, and our post-mortems to exhibit

greater and more decided evidences of disease within the cranium; and these changes to be still more marked, when, as is probably the case in our epidemic, the poison is either concentrated, or there exists a prevailing susceptibility to its influence. I have not attempted to discuss the subject of contagion, as connected with this disease, because the facts are too few and observation has been too incomplete to authorize any decided opinion. In seeking for the cause of this determination to the brain would the conjecture be hazardous that refers it, in part, to the mental tension engendered by the gigantic intestine contest that has afflicted our country for the past four years? May not the storm of political strife, the feverish speculation, and thirst for gain, the anxiety for the absent, the sorrow for the dead, the almost delirious excitement and passion, that have ruled the minds of men during these turbulent years of suffering and bloodshed; may not these emotions have contributed to invite the action of the morbid cause to that organ, which is itself the seat and instrument of all our thoughts and feelings?

In conclusion, as appropriate to the discussion and irreconcilable opinions that have been, and are being recorded, concerning this disease, I would say, in the language of Sir Henry Holland: "Hasty and imprudent belief may here become a cause of serious mischief, the wider in its spread as the minds most prone to this credulity are those most ready also to publish to the world their premature conclusions, and thus mislead the many who found their own practice upon faith in others, or who seek after novelty as if this were in itself an incontestable good."

FREDERICK CITY, MARYLAND, JULY 20, 1865.

ART. VIII.—*On the Treatment of Gunshot Injuries of the Head.* By JOHN ASHURST, JR., M.D., one of the Surgeons to the Episcopal Hospital, and late Executive Officer to the Cuyler U. S. A. Hospital.

In the number of the *American Journal of the Medical Sciences* for July, 1864, I reported a number of cases of injuries of the head, occurring in civil life, in which operative treatment had been avoided, and from which I ventured to infer that the employment of the trephine was in most instances of but questionable utility.

The cases which I have included in the present paper are of injuries received by gunshot wound, and are therefore of the class in which trephining is generally represented as especially indicated. They came under my observation in the Cuyler U. S. A. Hospital, and it is from the notes of the medical officers of that hospital that my reports are compiled. In two of the five cases recovery ensued, a fair proportion when the severity